Responses of Hawaiian Monk Seals to Human Disturbance and Handling

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Accounts of human interactions with Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI) have been noted since the 1800s through records of shipwrecked crews, visiting scientists and others (Hiruki and Ragen 1992). The effects of this land-based disturbance and killing led to extirpation of the seal populations at some sites in the 1900s. Known Hawaiian monk seal interactions with Hawaii fisheries were summarized by Nitta and Henderson (1993). Kenyon (1980) and Ragen (1999) are excellent published summaries of the full history of human activities and their population effects on Hawaiian monk seals.

In recent history, since the late 1950s, human disturbance and its effects on the numbers of seals using several sites has been documented somewhat better than in earlier years. The first NWHI-wide beach counts (not population size) of monk seals were conducted in 1957 and showed nearly 1,200 seals (Rice 1960). The 1960s and 1970s saw a decline of 50% in these beach counts and during the 1980s and 1990s another 10% decline (see Figure 1). Today, the estimated total monk seal population is about 1,400 animals.

Below, beginning in the late 1950s, I provide a summary of the situations where certain known human activities in the NWHI impacted monk seals and the consequences to the seal populations were also recorded. I also present the findings of two studies that attempted to measure the effects of certain monk seal research projects that required restraint of the seals. Finally, I‘ve noted some personal observations of monk seal responses to potentially disturbing human activities.

1. Summary of documented reports and incidents

***NWHI population decline leading to endangered listing of the monk seal (1957 - 1976)*:** The first beach counts of seals in the NWHI in 1957 (Kenyon and Rice 1959, Rice 1960) serve as the benchmark against which all subsequent counts are measured. By the mid-1970s the overall beach counts had declined by about 50% (Johnson et al. 1982). This dramatic drop in the seal count was driven primarily by very large reductions in seals at the three most western sites: Kure Atoll, Midway Islands, and Pearl and Hermes Reef. In the central NWHI, Laysan and Lisianski Islands‘ seal counts declined by 50% and the counts at French Frigate Shoals actually increased several fold, however this latter change was not sufficient to make up for the losses in

the other breeding populations. These changes led to the listing of the monk seal as endangered in 1976.

Kenyon (1972) attributed the loss of seals in the western populations to human disturbance. He suggested that harassment of seals on the beaches at Kure (Coast Guard) and Midway (Navy) by humans, dogs, and vehicles forced females to seek pupping habitat other than their preferred, protected sites. The seals' refuges from this disturbance were the small sand islets at the atolls, but these locations were highly vulnerable to changing currents and weather. The small islets can change shape and even disappear overnight leaving pups vulnerable to shark attack. And, though less frequent than on the human inhabited islands, the tiny islets were also visited by glass float collectors. Human disturbance of seals on these small islands could easily chase a mother and her pup offshore leading to loss of the pup to sharks or drowning. These circumstances resulted in high pup mortality during the 1960s and 1970s.

In the mid-1960s, research conducted on monk seals at Kure by Wirtz (1968) was also a likely contributing factor in the high loss of pups during his two years of field work there. He assessed pup survival and found that only one of the 62 pups born in 1964-65 survived to one year of age. His research, however, involved repeated handling of nursing pups which would have caused a high level of disturbance not only to the mother-pup pairs, but to other seals hauled on the beaches as well. In their summary of the monk seal population changes during the 1960s-1970s, Johnson et al. (1982) noted that most of the pup mortality occurred near weaning.

Gilmartin and Gerrodette (1990) discuss the population changes at Kure under Coast Guard occupation and show (see Figure 2) the dramatic change in number of seals hauled on Green Island after construction of the LORAN navigation station in 1960.

The reasons for the seal declines at Pearl and Hermes Reef and Lisianski and Laysan Islands during this same time period are not well understood. Military visits and activities at these locations are known or suspected to have occurred, however no thorough documentation of the activities or the effects on the seal populations are available.

Hauling changes on Tern Island, French Frigate Shoals, after Coast Guard departure (1979): A Coast Guard LORAN station (managed by about 20 staff) was constructed at Tern Island in 1954 and during its operational life monk seals were rarely observed on the island in spite of the fact that during these same decades the number of seals using the other islands at this atoll was increasing several fold. In 1979, the Coast Guard decommissioned the station and passed the facility to the Fish and Wildlife Service (FWS). The FWS has maintained a small permanent staff there which is augmented during the spring-summer months with their volunteers and National Marine Fisheries Service (NMFS), University of Hawaii, etc. scientists

conducting various wildlife research at the atoll. Although people still occupied the islands facilities, beach activities were highly restricted. Schulmeister (1981) monitored monk seal hauling on Tern Island after the Coast Guard departure and the changes she observed were the basis for a continuing effort there to document the seals response to reduced human activity. The change was striking (see Figure 2) and illustrates how quickly monk seals may change their hauling behavior once human disturbance is reduced.

Hauling and pup survival changes at Kure with NMFS presence reducing Coast Guard disturbance (1981 - 1991): In 1981, NMFS began a project at Kure called AHead Start@ to attempt to enhance pup survival above the very low level of the 1960s-1970s. NMFS staff were present at the atoll during spring and summer months each year to manage the operation, until it stopped 1991. Female pups were collected after weaning and held in a beach enclosure until they were released at the end of each summer. Survival increased dramatically in both the Head Start female pups and in the male pups which had not been protected in the enclosure. Birth locations shifted also. Gerrodette and Gilmartin (1990) illustrate the immediate (in 1981-82) monk seal birthing return to Green Island (the seals preferred pupping island) from the small sand islets where pup survival was greatly compromised (see Figure 3). These combined positive changes suggest that human disturbance on Green Island decreased because the NMFS presence at the atoll encouraged Coast Guard compliance with their own restrictions on beach activities. The seals responded quickly to the change in beach behavior of the Coast Guard personnel.

Seal hauling and birth site changes at Midway following beach closures (1990s): The monk seal population at Midway declined by over 90% during the 1950s-1960s. The cause was attributed to human disturbance of hauling and pupping beaches by Navy military and recreational activities (Kenyon 1972). The number of Navy personnel and Navy contractors decreased during the following decades to about 300 during the 1980s to mid-1990s. Monk seal births were occasionally noted during the 1980s, ranging from 0-2 per year, with a small increase in the early 1990s. In October 1996, the Navy left Midway and transferred the atoll to the Fish and Wildlife Service. Midway Atoll National Wildlife Refuge became an ecotour, diving, and fishing destination, but to protect monk seals human access was restricted at most atoll beaches (except a few areas on Sand Island) and boat access was restricted in the near-shore waters. Following these changes, and in spite of subsequent occasional human intrusion and seal disturbance on the restricted beaches, monk seal counts at the atoll doubled in the next two years. Births are now averaging 12/year since 1997 (the highest number of births since the late 1950s), the first known births have occurred on Sand Island (the human-occupied island), and a higher fraction of the hauling around the atoll now occurs on Sand Island. The increasing total beach counts are due primarily to an increase in the number of transient seals from other island populations. The increase in births is from immigrant adult females that had been resident at the

neighboring uninhabited atolls. We presume the immigration and higher fraction of hauling on Sand Island and increasing births are due to reduced harassment of hauled out seals following the beach closures.

Effects of monk seal pup flipper tagging (1982): As a preliminary evaluation of the use of flipper tags to monitor monk seal growth, survival, and migration, NMFS conducted an experiment at Lisianski Island in 1982 to assess the effects of tagging on weaned pups (Henderson and Johanos 1988). Hauling behavior of flipper tagged and non-tagged pups were monitored. Although during the first two weeks after tagging, the tagged pups hauled out farther from their tagging site than the control group of seals, this effect disappeared by 4 weeks post-tagging. Overall, analyses of percentage of days seen ashore and the numbers and lengths of trips from the island revealed no differences between the two groups and no differences were apparent in a test of 14 other behavioral categories. First year survival was similar for both groups with no mortality due to tagging detected. The flipper tagging procedure usually involves hand capture of a resting seal and restraint for a few minutes. Some pups have been observed to immediately go back to sleep on the beach after the procedure. After this evaluation, tagging became a routine procedure at all islands enabling NMFS to monitor growth and survival, movement, reproductive patterns, etc. and the tagging has permitted evaluation of the effects of recovery actions.

Effects of application of tracking instruments to monk seals: This study examined the effects of handling monk seals to place instrument packages on them. These seals were captured in nets, physically restrained, sedated with Valium, and then instrumented (Baker and Johanos 2002). Blubber biopsies, blood samples, and culture swabs were also collected from some of the experimental animals while sedated. Resighting rates at one year, migration rates to other atolls, and body condition of these seals were compared with control seals that were of the same sex, age and location but were not handled. No significant differences were found between the two groups in these categories of effects.

Human-assisted pup foster care to enhance survival: Post-partum lactating monk seals are known to allow suckling by pups other than their own (Boness 1990). Pup exchanges between females in close proximity are not uncommon and pup fosterings by females whose pups died prematurely have been observed. In 1986 and 1988, in an attempt to employ this foster care behavior to aid pup survival, four human-managed pup relocations to females without pups were attempted (Gerrodette et al. 1992). The pups were all under one week old and the recipient females were without pups (due to death or separation of the pup), but known to have had a recent pup and likely to still be lactating. The pups were hand captured and relocated to near the recipient females. Of these four cases of human-assisted fostering, all four pups nursed to normal weaning time and size, however it is not known if they all continued nursing on the

intended foster mother. With appropriate care not to disturb the adult females, the authors demonstrated that human intervention in these situations can benefit pup survival.

2. Additional observations of the author:

Aircraft Overhead: During the Head Start project at Kure in the 1980s, I visited the atoll many times and observed Coast Guard C-130s (a 4-engine propeller aircraft) approach the runway for landings. The usual approach to the runway for the bi-monthly flights was from the west where the end of the runway was at the top of the narrow beach at that end of the island. During the spring and early summer months, mother-pup pairs were sometimes on the beach or in the water below the approach. The planes at this point were 20' - 100' above the ground. During at least 10 observations here during aircraft approaches, I was never able to detect more of a response by a seal than fleeting glance to the aircraft or noise, and I never saw a change in the ongoing behavior patterns of the mothers and their pups.

Dredging operations: In the early 1990s, I visited Tern Island at French Frigate Shoals for the specific purpose of watching a barge mounted crane dredge along the seawall at the northwest corner of the island to move the sand to fill inside the seawall in that area where wave erosion had depleted much of the sand through the decaying steel pilings. I wanted to observe the reaction of monk seals to the operation. Only a few seals swam near the barge each day while the dredging work was being done. The dredge bucket was usually dropped from 10'-20' above the water to the bottom of the channel, then lifted to a height above the seawall and swung over the wall and dumped onto the island. If a seal came near the area where the bucket was being dropped, I was to signal the dredge operator to wait until it was clear again - this was never necessary. Seals that transited the area during dredging swam away from the equipment far enough (at least 50') that they were not of concern. The seals that passed the barge swam at least 10' from it. The seals did not appear particularly interested in the dredging operation nor did they appear to be afraid of it. Passing seals continued swimming without a change in speed or direction and did not seem startled by the noise of the equipment or the bucket dropping into the water.

Relocation of a mother-pup pair: In 1990, a monk seal pup was born on Oahu=s north shore. The birth location was on a sandy beach at the mouth of a dry stream bed. Within a few days of the birth, a rainstorm caused the creek to reach flood stage. The stream cut through the beach sand and the pup fell into the stream and was washed offshore. A FWS person who was familiar with monk seals saw this happen and he swam to the pup and brought it back to shore and placed it where the mother could see and hear it, and they quickly reunited. Later, as the stream continued to widen, the pup was again threatened with falling into the water and being washed offshore. I decided to move the mother-pup pair far along the beach by using the pup as Abait@ to

relocate the mother. I was able to sneak up to the pair without being noticed and grab the pup. Both mother and pup vocalized, the female tried to approach me as I retreated slowly down the beach in the direction I wanted to move the pair. We slowly moved about 100' down the beach in this manner and then I placed the pup at the beach berm and retreated out of sight. The mother quickly moved to the pup and they stayed in this vicinity on the beach and in the water until successful weaning weeks later. The relocation site had rocky shallow water near shore similar to some preferred pupping locations in the NWHI (Westlake and Gilmartin 1990).

Tolerance of some seals in the main Hawaiian islands (MHI) to human presence: I have observed many seals on beaches in the MHI and most appear to be much more tolerant of humans near them than their counterparts in the NWHI. Some have an extreme tolerance of people. I=ve observed people approach close to sleeping seals, one person with a camera to within a foot of a seal=s face, and seen the seals open their eyes, take note of the human presence and then close their eyes again, apparently without their feeling concerned or threatened by the human encroachment. This difference in tolerance to people may be a necessary survival trait in the MHI, without which they would not get to rest unless they moved to the very remote MHI beaches.

3. Conclusions

Reactions of individual monk seals to humans vary widely. Generally, age and sex differences are noticeable. Tolerance is most apparent in pups, but then fades with age of the seal. In adult seals, males appear more tolerant of humans than females, and females with pups are more likely to de disturbed by an approaching human than any other age or sex of seal. Also, as noted above, the seals in the MHI seem more tolerant of humans near them.

Monk seals also respond differently to humans depending on whether they are on the beach or in the water. While seals seeing a human on the beach are likely to flee to the water, seals sighting a human in the water are likely to close the distance to investigate and may actually approach quite close and stay in the vicinity for a while.

Some individual seals that have been handled or harassed will show a heightened sensitivity on the beach to human presence. They will noticeably look around, scanning the beach much more than other seals, and are more likely to flee from human presence at a greater distance than other seals. This behavior can last for weeks, months, or even to the following year after the handling event. This possible effect of handling was not tested for in the study of Baker and Johanos (2002).

Although some of the older monk seal literature indicates pups may have been abandoned by their mothers in response to human disturbance, I do not believe a monk seal would abandon a pup. I have observed some extreme cases of harassment of mother-pup pairs by people and never observed the female leave the pup. Unintentional misplacement of the pup can occur when the female jousts with another seal, attempts to chase off a shark near shore, or is responding to human threats, but in these cases the mother will immediately return to seek out her pup as soon as the threat is resolved. When I moved the young nursing pup on Oahu, I was certain the female would follow as long as she could hear or see her pup.

Repeated beach disturbance over time seems to be an important factor in causing monk seals to abandon certain otherwise preferred hauling sites. Single or infrequent disturbance events, thought possibly causing a seal to flee at the time of the event, may not discourage long term use of a beach.

References

Baker, J.D., and T.C. Johanos. 2002. Effects of research handling on the endangered Hawaiian monk seal. Marine Mammal Science 18:500-512.

Boness, D.J. 1990. Fostering behavior in Hawaiian monk seals: Is there a reproductive cost? Behavioral Ecology and Sociobiology 27: 113-122.

Gerrodette, T., M.P. Craig, and T.C. Johanos. 1992. Human-assisted fostering of Hawaiian monk seal pups. ›Elepaio 52: 43-46.

Gerrodette, T. and W.G. Gilmartin. 1990. Demographic consequences of changed pupping and hauling sites of the Hawaiian monk seal. Conservation Biology 4: 23-430

Henderson, J.R. and T.C. Johanos. 1988. Effects of tagging on weaned Hawaiian monk seal pups. Wildlife Society Bulletin 16: 312-317

Hiruki, L.M. and T.J. Ragen. 1992. A compilation of historical Hawaiian monk seal (*Monachus schauinslandi*) counts. U.S. Department of Commerce, NOAA Technical Memorandum. NOAA-TM-NMFS-SWFSC-172. 183p.

Johnson, A.M., R.L. DeLong, C.H. Fiscus, and K. Kenyon. 1982. Population status of the Hawaiian monk seal (Monachus schauinslandi), 1978. Journal of Mammalogy 63: 415-421.

Kenyon, K.W. 1972. Man versus the monk seal. Journal of Mammalogy 53:687-696.

Kenyon, K.W. 1980. No man is benign - the endangered monk seal. Oceans Magazine May: 48-54.

Nitta, E.T. and J.R. Henderson. 1993. A review of interactions between Hawaii=s fisheries and protected species. Marine Fisheries Review 55:83-92.

Ragen, T.J. 1999. Human activities affecting the population trends of the Hawaiian monk seal. Pages 183-194 *in* J.A. Musick, ed. Life in the slow lane - ecology and conservation of long-lived marine animals. American Fisheries Society Symposium 23. American Fisheries Society, Bethesda, MD.

Rice, D.W. 1960. Population Dynamics of the Hawaiian monk seal. Journal of Mammalogy 41:376-385.

Schulmeister, S. 1981. Hawaiian monk seal numbers increase on Tern Island. ›Elepaio 41: 62-63.

Westlake, R.L. and W.G. Gilmartin. 1990. Hawaiian monk seal pupping locations in the Northwestern Hawaiian Islands. Pacific Science 44: 366-383.

Wirtz, W.O. 1968. Reproduction, growth and development and juvenile mortality in the Hawaiian monk seal. Journal of Mammalogy 49: 229-238.